

Amendments to the Claims

The listing of claims will replace the previous version, and the listing of claims:

Listing of Claims

1. (Previously presented) A fluorescent substance comprising a crystal of nitride or oxy-nitride having a β -type Si_3N_4 crystal structure having Eu^{+2} solid-dissolved into it and emitting a fluorescent light having a peak within a range of 500nm to 600nm in wavelength by being irradiated with an excitation source.
2. (Original) A fluorescent substance according to claim 1, wherein said crystal having a β -type Si_3N_4 crystal structure comprises a β -type sialon ($\text{Si}_{6-z}\text{Al}_z\text{O}_z\text{N}_{8-z}$, where $0 \leq z \leq 4.2$).
3. (Previously presented) A fluorescent substance according to claim 2, wherein the value of said z is $0 \leq z \leq 0.5$.
4. (Previously presented) A fluorescent substance according to claim 1, wherein in case of representing Eu, A (where A is one, two or more kinds of elements selected from C, Si, Ge, Sn, B, Al, Ga and In) and X (where X is one or two kinds of elements selected from O and N) which are contained in said nitride or oxy-nitride crystal with a composition formula $\text{Eu}_a\text{A}_b\text{X}_c$ (where $a + b + c = 1$), a , b and c in this formula meet the following relations (i) to (iii):
$$0.00001 \leq a \leq 0.1 \dots \dots \dots \text{(i)}$$
$$0.38 \leq b \leq 0.46 \dots \dots \dots \text{(ii)}$$
$$0.54 \leq c \leq 0.62 \dots \dots \dots \text{(iii)} .$$
5. (Previously presented) A fluorescent substance according to claim 1, wherein in case of representing said nitride or oxy-

nitride crystal with a composition formula $\text{Eu}_a\text{Si}_{b_1}\text{Al}_{b_2}\text{O}_{c_1}\text{N}_{c_2}$ (where $a + b_1 + b_2 + c_1 + c_2 = 1$), a , b_1 , b_2 , c_1 and c_2 in this formula meet the following relations (i) to (v):

$$0.00001 \leq a \leq 0.1 \dots \dots \dots (i)$$

$$0.28 \leq b_1 \leq 0.46 \dots \dots \dots (ii)$$

$$0.001 \leq b_2 \leq 0.3 \dots \dots \dots (iii)$$

$$0.001 \leq c_1 \leq 0.3 \dots \dots \dots (iv)$$

$$0.4 \leq c_2 \leq 0.62 \dots \dots \dots (v) .$$

6. (Previously presented) A fluorescent substance according to claim 5, wherein in said composition formula $\text{Eu}_a\text{Si}_{b_1}\text{Al}_{b_2}\text{O}_{c_1}\text{N}_{c_2}$, the relation between b_1 and b_2 and the relation between c_1 and c_2 respectively meet the following relations:

$$0.41 \leq b_1 + b_2 \leq 0.44, \text{ and}$$

$$0.56 \leq c_1 + c_2 \leq 0.59.$$

7. (Previously presented) A fluorescent substance according to claim 1, wherein said excitation source is an ultraviolet light or a visible light of 100nm to 500nm in wavelength.

8. (Previously presented) A fluorescent substance according to claim 7, wherein said excitation source is a violet light or a blue light of 400nm to 500nm in wavelength.

9. (Previously presented) A fluorescent substance according to claim 1, wherein said excitation source is an electron beam or an X ray.

10. (Previously presented) A fluorescent substance according to claim 1, wherein said peak is within a range of 500nm to 550nm in wavelength.

11. (Previously presented) A fluorescent substance according to claim 1, wherein x and y of a value (x, y) on a CIE chromaticity coordinates of a color of light emitted at a time of being irradiated with said excitation source meet the following relations (i) and (ii):

$$0 \leq x \leq 0.3 \dots \dots \dots (i)$$

$$0.5 \leq y \leq 0.83 \dots \dots \dots (ii) .$$

12. (Previously presented) A fluorescent substance according to claim 1, wherein said nitride or oxy-nitride crystal comprises a single crystal of 50nm to 20 μ m in average grain diameter.

13. (Previously presented) A fluorescent substance according to claim 1, wherein said nitride or oxy-nitride crystal is a single crystal of 1.5 to 20 in average aspect ratio.

14. (Previously presented) A fluorescent substance according to claim 1, wherein a total of impurity elements Fe, Co and Ni contained in said nitride or oxy-nitride crystal is not more than 500ppm.

15. (Previously presented) A fluorescent substance comprising a crystal of nitride or oxy-nitride having a β -type Si_3N_4 crystal structure having Eu^{+2} solid-dissolved into it and emitting a fluorescent light having a peak within a range of 500nm to 600nm in wavelength by being irradiated with an excitation source,

wherein said fluorescent substance further comprises another crystalline or amorphous compound different from said nitride or oxy-nitride crystal and a quantity of said nitride or oxy-nitride crystal contained in said fluorescent substance is 50 wt% or more.

16. (Original) A fluorescent substance according to claim 15, wherein said another crystalline or amorphous compound is an electrically conductive inorganic compound.

17. (Previously presented) A fluorescent substance according to claim 16, wherein said electrically conductive inorganic compound is oxide, oxy-nitride, or nitride containing at least one element selected from Zn, Ga, In and Sn, or mixture thereof.

18. (Previously presented) A fluorescent substance manufacturing method for manufacturing a fluorescent substance according to claim 1, comprising a process of burning a raw material mixture containing metal, oxide, carbonate, nitride, fluoride, chloride or oxy-nitride of Eu, silicon nitride and aluminum nitride at a temperature of 1820°C to 2200°C in a nitrogen atmosphere.

19. (Canceled)

20. (Previously presented) A fluorescent substance manufacturing method according to claim 18, wherein said nitrogen atmosphere in said process of burning is a nitrogen atmosphere within a pressure range of 0.1MPa to 100MPa.

21. (Currently amended) A fluorescent substance manufacturing method according to claim 18, further comprising a process of ~~obtaining said raw material mixture by~~ filling a container with a

~~metal compound~~ said raw material mixture in a form of powder or aggregate in a state of keeping said mixture at a filling factor of 40% or less in volume density before said process of burning.

22. (Original) A fluorescent substance manufacturing method according to claim 21, wherein said container is made of boron nitride.

23. (Currently amended) A fluorescent substance manufacturing method according to claim 21, wherein said ~~metal compound~~ raw material mixture in the form of aggregate is 500 μ m or less in average grain diameter.

24. (Currently amended) A fluorescent substance manufacturing method according to claim 23, further comprising a process of making said ~~metal compound~~ raw material mixture in the form of aggregate be 500 μ m or less in average grain diameter by means of spray dryer, sieving or wind classification.

25. (Previously presented) A fluorescent substance manufacturing method according to claim 18, wherein said burning is made by using exclusively a normal pressure sintering method or a gas pressure burning method without using a hot press.

26. (Previously presented) A fluorescent substance manufacturing method according to claim 18, further comprising a process of grain-size-adjusting the burnt fluorescent substance so as to be powder of 50nm to 20 μ m in average grain diameter by one or plural means selected from grinding, classification and acid treatment.

27. (Previously presented) A fluorescent substance manufacturing method according to claim 26, further comprising a process of performing a heat treatment on the fluorescent substance after said burning process or after said grain size adjusting process at a temperature not lower than 1000°C and lower than a burning temperature in said process of burning.

28. (Previously presented) A fluorescent substance manufacturing method for manufacturing a fluorescent substance comprising a crystal of nitride or oxy-nitride having a β -type Si_3N_4 crystal structure having Eu^{+2} solid-dissolved into it and emitting a fluorescent light having a peak within a range of 500nm to 600nm in wavelength by being irradiated with an excitation source,

said method comprising a process of burning a raw material mixture containing metal, oxide, carbonate, nitride, fluoride, chloride or oxy-nitride of Eu, silicon nitride and aluminum nitride at a temperature of 1820°C to 2200°C in a nitrogen atmosphere,

wherein said raw material mixture contains an inorganic compound forming a liquid phase at a temperature not higher than the burning temperature in said process of burning.

29. (Previously presented) A fluorescent substance manufacturing method according to claim 28, wherein said inorganic compound forming the liquid phase at a temperature not higher than said burning temperature comprises at least one of fluoride, chloride, iodide, bromide and phosphate of at least one element selected from Li, Na, K, Mg, Ca, Sr and Ba.

30. (Previously presented) A fluorescent substance manufacturing method according to claim 29, wherein said inorganic compound

forming the liquid phase at a temperature not higher than said burning temperature is calcium fluoride.

31. (Previously presented) A fluorescent substance manufacturing method according to claim 28, wherein said raw material mixture contains the inorganic compound forming the liquid phase at a temperature not higher than said burning temperature at the ratio of 0.1 to 10 in weight of said inorganic compound to 100 in weight of said raw material mixture.

32. (Previously presented) A fluorescent substance manufacturing method according to claim 28, further comprising a process of cleaning said burnt mixture with a solvent so as to reduce quantity of said inorganic compound forming the liquid phase at a temperature not higher than said burning temperature after said burning process.

33-41. (Canceled)

42. (Previously presented) An image display device comprising an excitation source and a fluorescent substance, wherein said fluorescent substance comprises the fluorescent substance according to claim 1.

43. (Previously presented) An image display device according to claim 42, comprising at least one of a fluorescent display tube, a field emission display, a plasma display panel and a cathode ray tube.

44. (New) An image display device comprising an excitation source and a fluorescent substance, wherein said fluorescent substance comprises the fluorescent substance according to claim 15.

45. (New) image display device according to claim 44, comprising at least one of a fluorescent display tube, a field emission display, a plasma display panel and a cathode ray tube.